

Claims

- [c1] 1. An online firmware update system, applied in a liquid crystal panel display controller, the online firmware update system comprising:
- a rewritable memory, containing a main control program with a writing function, wherein the main control program by the writing function can be erased from the rewritable memory and an upgrade main control program can be written into the rewritable memory via the write pin; and
 - a controller, coupled to the rewritable memory, comprising:
 - a built-in storage unit, temporarily storing an update subroutine of the main control program by using a continuous mapping address, wherein the built-in storage unit comprises a control register for temporarily storing a control signal;
 - a microprocessor, built at outside or inside of the controller; and
 - a control interface, coupled to the rewritable memory, the built-in storage unit and the microprocessor, wherein the control interface receives the control signal temporarily stored in the control register of the built-in storage unit to determine a fetch priority of the built-in storage unit and the rewritable memory and to build up a write channel between the microprocessor and the rewritable memory;
- wherein the microprocessor reads out the update subroutine stored in the rewritable memory, writes the update subroutine into the continuous mapping address of the built-in storage unit by the control interface, and fetches and executes the update subroutine in the built-in storage unit to write the upgrade main control program into the rewritable memory.
- [c2] 2. The online firmware update system of claim 1, wherein the type of the rewritable memory comprises a flash-ROM or an EEPROM.
- [c3] 3. The online firmware update system of claim 1, wherein the main control program and the update subroutine have a function call relationship.
- [c4] 4. The online firmware update system of claim 1, wherein the storage address of the rewritable memory used to store the update subroutine is different from the storage address of the built-in storage unit used to store the update

subroutine.

- [c5] 5. The online firmware update system of claim 1, wherein if a fetch address sent by the microprocessor is equal to the continuous mapping address, the fetch priority belongs to the built-in storage unit.

- [c6] 6. The online firmware update system of claim 1, wherein if a fetch address sent by the microprocessor is not equal to the continuous mapping address, the fetch priority belongs to the rewritable memory.

- [c7] 7. An OSD (On-Screen-Display) parameters modification system, applied in a liquid crystal panel display controller, comprising a controller, the OSD parameters modification system comprising:
 - a rewritable memory, coupled to the controller, containing a main control program and an OSD parameters with a writing function, wherein the controller erases the OSD parameters from the rewritable memory and writes a modified OSD parameters into the rewritable memory via the writing function;
 - a built-in storage unit, built inside the controller, temporarily storing an overwritten subroutine of the main control program and the OSD parameters by using a continuous mapping address, wherein the built-in storage unit comprises a control register for temporarily storing a control signal;
 - a microprocessor, built at outside or inside of the controller; and
 - a control interface, coupled to the rewritable memory, the built-in storage unit and the microprocessor, wherein the control interface receives the control signal temporarily stored in the control register of the built-in storage unit to determine a fetch priority of the built-in storage unit and the rewritable memory to build up a write channel between the microprocessor and the rewritable memory;

wherein the microprocessor fetches the overwritten subroutine and the OSD parameters stored in the rewritable memory, writes the overwritten subroutine and the OSD parameters into the continuous mapping address of the built-in storage unit, and fetches and executes the overwritten subroutine in the built-in storage unit to write the modified OSD parameters into the rewritable memory.

- [c8] 8. The OSD parameters modification system of claim 7, wherein the type of the rewritable memory comprises a flash-ROM or an EEPROM.
- [c9] 9. The OSD parameters modification system of claim 7, wherein the main control program and the overwritten subroutine have a function call relationship.
- [c10] 10. The OSD parameters modification system of claim 7, wherein the storage address of the rewritable memory used to store the overwritten subroutine and the OSD parameters is different from the storage address of the built-in storage unit used to store the overwritten subroutine and the OSD parameter.
- [c11] 11. The OSD parameters modification system of claim 7, wherein if the control signal is set up in an enable state and a fetch address sent by the microprocessor is equal to the continuous mapping address, the fetch priority belongs to the built-in storage unit.
- [c12] 12. The OSD parameters modification system of claim 7, wherein if the control signal is set up in an enable state and a fetch address sent by the microprocessor is not equal to the continuous mapping address, the fetch priority belongs to the rewritable memory.
- [c13] 13. A control interface, applied in the liquid crystal panel display, coupled to a microprocessor, a built-in storage unit and a rewritable memory, the control interface comprising:
a multiplexer, comprising:
a first selection terminal, coupled to the microprocessor, used to receive a write signal sent by the microprocessor;
a first output terminal, coupled to a write pin of the rewritable memory; and
a control signal input terminal, used to receive a control signal, wherein when the control signal enables the first selection terminal, the write signal is sent from the first output terminal to the write pin of the rewritable memory;
a control register, contained inside the built-in storage unit, temporarily storing the control signal; and
a bus interface unit, coupled to the microprocessor and the built-in storage

unit, having a first determination rule, wherein the first determination rule determines only whether under a condition where a fetch signal sent by the microprocessor is received, and the received control signal is in an enable state, and a fetch address of the microprocessor is equal to a mapping address of the built-in storage unit, the fetch code operation is performed onto the built-in storage unit.

[c14] 14. The control interface of claim 13, wherein the multiplexer further comprises a second selection terminal, having a default value, the default value is defined to prevent the write malfunction to the rewritable memory.

[c15] 15. The control interface of claim 13, wherein the bus interface unit further comprises a second determination rule, wherein the second determination rule determines whether under the situation where the write signal and a read signal sent by the microprocessor are received, and the access address of the microprocessor is equal to the mapping address of the built-in storage unit, the access operation is only performed onto the built-in storage unit.

[c16] 16. The control interface of claim 13, wherein the type of the rewritable memory comprises a flash-ROM or an EEPROM.

[c17] 17. The control interface of claim 13, further comprising an AND gate circuit, comprising:
 a first receiving terminal, coupled to the microprocessor, used to receive the read signal of the microprocessor;
 a second receiving terminal, coupled to the microprocessor, used to receive the fetch signal of the microprocessor; and
 a second output terminal, coupled to the rewritable memory, used to output either the read signal or the fetch signal.

[c18] 18. An online firmware update method, applied in the liquid crystal panel display, wherein the liquid crystal panel display comprises a controller, which can be implemented internal or external of a microprocessor, and a rewritable memory, the online firmware update method comprises the steps of:
 copying an update subroutine of the rewritable memory into a built-in storage

unit of the controller;
enabling a control signal of the controller;
calling the update subroutine of the built-in storage unit by using a function call;
erasing the rewritable memory;
downloading an upgrade main control program; and
writing the upgrade main control program into the rewritable memory to accomplish the online firmware update operation of the rewritable memory.

- [c19] 19. The online firmware update method of claim 18, wherein the rewritable memory comprises a main control program, the main control program comprises the update subroutine, moreover the main control program and the update subroutine have a function call relationship.
- [c20] 20. The online firmware update method of claim 19, wherein the step of erasing the rewritable memory erases the main control program in the rewritable memory.
- [c21] 21. The online firmware update method of claim 18, wherein the step of enabling the control signal builds up a write channel between the controller and the rewritable memory.
- [c22] 22. The online firmware update method of claim 18, wherein the storage address of the rewritable memory used to store the update subroutine is different from the storage address of the built-in storage unit used to store the update subroutine.
- [c23] 23. The online firmware update method of claim 18, wherein the type of the rewritable memory comprises a flash-ROM or an EEPROM.
- [c24] 24. An on-screen-display (OSD) parameters modification method, applied in the liquid crystal panel display, wherein the liquid crystal panel display system comprises a controller and a rewritable memory, the OSD parameters modification method comprising the steps of:
copying the OSD parameters and an overwritten subroutine of the rewritable memory into a built-in storage unit of the controller;

updating the OSD parameters of the built-in storage unit;
enabling a control signal of the controller;
calling the overwritten subroutine of the built-in storage unit;
erasing a storage area of the rewritable memory where the OSD parameters are stored; and
writing a modified OSD parameters into the rewritable memory.

- [c25] 25. The OSD parameters modification method of claim 24, wherein the rewritable memory comprises a main control program, the main control program comprises the overwritten subroutine, moreover the main control program and the overwritten subroutine have a function call relationship.
- [c26] 26. The OSD parameters modification method of claim 24, wherein the step of enabling the control signal builds up a write channel between the controller and the rewritable memory.
- [c27] 27. The OSD parameters modification method of claim 24, wherein the storage address of the rewritable memory used to store the overwritten subroutine and the OSD parameters is different from the storage address of the built-in storage unit used to store the overwritten subroutine and the OSD parameter.
- [c28] 28. The OSD parameters modification method of claim 24, wherein the type of the rewritable memory comprises a flash-ROM or an EEPROM.